

CONTRIBUTIONS TOWARD A REVISION OF *HECHTIA*
(BROMELIACEAE, PITCAIRNIOIDEAE).
I. NEW AND NOTEWORTHY SPECIES OF *HECHTIA* FROM MEXICO

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ABSTRACT

Hechtia hintoniana Burt-Utley, Utley, & García-Mendoza, *Hechtia michoacana* Burt-Utley, Utley, & García-Mendoza, *Hechtia oaxacana* Burt-Utley, Utley, & García-Mendoza, and *Hechtia pueblensis* Burt-Utley, Utley, & García-Mendoza are described as new, illustrated, and discussed, while *H. sphaeroblata* B.L. Robinson is reinterpreted. The taxonomic status of three species, *H. bracteata* Mez (syn. *H. confusa* L.B. Smith), *H. texensis* L.B. Smith (syns. *H. elliptica* L.B. Smith and *H. zacatacae* L.B. Smith), and *H. glomerata* (syn. *H. mexicana* L.B. Smith), are evaluated. *Hechtia tehuacana* B.L. Robinson is lectotypified and its continued status as a heterotypic synonym of *H. podantha* Mez is discussed.

KEY WORDS: Bromeliaceae, *Hechtia*, México, Michoacán, Oaxaca, Puebla.

Hechtia Klotzsch (Bromeliaceae) is a genus of approximately 55 species that occurs primarily in seasonally dry karstic regions in Mexico. Within Mexico, the genus is best represented in Oaxaca and adjacent Puebla where 19 species have been reported, including the two described herein (pers. obs.; Smith & Downs 1974). Most of these species have very limited distributions that may result from geographic barriers to dispersal as well as from requirements for unique combinations of climatological and edaphic factors. Of the new taxa described here, *H. oaxacana* is known from several areas in northern Oaxaca, where individuals can be found on steep, exposed rocky cliffs and karstic hillsides. *Hechtia hintoniana* and *H. michoacana* occur in Michoacán and, considering their distributions, are expected within the range of Flora Novo-Galiciana. With the additions of these latter two species, there are now 12 *Hechtia* species recognized within all of Michoacán, Colima, and Jalisco. *Hechtia pueblensis* includes the pistillate material present on the type series of *H. tehuacana*. Because characterization of *H. tehuacana* was based primarily on leaves and staminate material, *H. tehuacana* is still considered a synonym of *H. podantha*. *Hechtia bracteata* is re-evaluated based on collections from Veracruz and Puebla, while further collections from northern Mexico support the synonymy of *H. elliptica* and *H. zacatacae* with *H. texensis* S. Watson. The synonymy of *H. mexicana* L.B. Smith with *H. glomerata* Zuccharini is discussed.

1. **HECHTIA HINTONIANA** Burt-Utley, Utley, & García-Mendoza, sp. nov. **TYPE. MEXICO.** México. Ladera con Guerrero, San Antonio, Tlatlaya, 750 m, 20 Jul 1954, *E. Matuda et al.* 31124 (holotype: MEXU; isotypes: CAS, MEXU, MO, NY, US). Figure 1.

Planta florens ad 20 dm alta; laminae spinosae ubique lepidotae. Inflorescentia probiliter terminalis; inflorescentia masculorum tripinnata sed femineorum bipinnata vel tripinnata lanata; masculorum rami laterales cum ramis secundaris (2—)3—6; rami laterales (4.5—)7.8—22 cm longi; ♀ rami laterales (6.5—)15—31 cm longi. Florum masculorum subsessilibus lepidotis; sepala ovato-triangularia vel oblonga, 0.7—1.3 mm longa lepidota. Florum femineorum pedicellis 0.8—1.5 mm longis lepidotis; sepala triangulares vel ovato-triangulares 1.7—2.1 mm longa lepidota. Capsulae ovoideae 8—10 mm longae.

Plants in flower with inflorescences to 20 dm high. Leaves presumably numerous; sheaths narrow, 3.5—5.5+ cm wide, marginally spinose and floccose, distally lepidote above and beneath; blades straight to somewhat falcate, very narrowly triangular to almost linear, 36.5—93+ cm long and 0.6—2.2(—3.5) cm wide above the sheath, lepidote above and beneath, the margins armed with generally antrorse red-brown to pale yellow tips 0.7—1.5 cm apart and 1.8—2.5 mm long. Inflorescences presumably terminal, in staminate individuals lepidote and twice compound with (2—)3—6 secondary branches; in pistillate individuals lepidote and once, or if twice compound then with 1—2 short secondary branches, scape to 88+ cm long, 1.2—1.4 cm diam, glabrous to glabrescent; lowermost scape bracts unknown, upper scape bracts chartaceous, ascending, shorter than the internodes, rarely equal to or exceeding the internodes, lance-ovate with adpressed linear-triangular blades 1.5—3.9 cm long; rachis to 10.2+ dm long, irregularly to finely lepidote; primary bracts chartaceous, generally shorter than all but the shortest lateral branches, ovate with short linear-triangular blades, 1.4—3(—4.4) cm long, marginally finely spinulose; lateral branches not articulated with the rachis, flattened throughout or rounded and sulcate distally, ascending to subascending, the staminate (4.5—)7.8—22 cm long, the pistillate (6.5—)15—31 cm long, densely many-flowered throughout or flowers in verticils, lepidote. **Staminate flowers** spreading to weakly ascending; floral bracts shorter than to exceeding the pedicels, chartaceous, ovate-triangular to oblong or suborbicular, flat to weakly convex, 0.7—1.5 x 0.4—1 mm, externally lepidote, marginally finely serrulate to erose, apically variable, spinulose or apiculate to praemorse; pedicels weakly articulated with the axis, stout, subsessile, lepidote; sepals somewhat imbricate, subequal, ovate-triangular to oblong, convex, 0.7—1.3 X 0.7—1.3 mm, marginally entire to erose distally, apically praemorse, lepidote to glabrous; petals spreading at anthesis, oblong-elliptic to ovate-elliptic becoming spatulate when dry, 2—3 X 1.4—2 mm, marginally entire, apically denticulate to praemorse, glabrous; stamens 6, filaments basally briefly adnate to the petals; ovary rudimentary. **Pistillate flowers** spreading to ascending; floral bracts shorter than to exceeding the pedicels, chartaceous, narrowly ovate-triangular, flat to weakly convex, 1.3—2.2 X 0.8—1.5 mm, marginally entire to serrulate or erose, apically attenuate-acuminate to praemorse, lepidote; pedicels articulated with the rachis, stout, 0.8—1.5 mm long, lepidote; sepals marginally hyaline, subimbricate, triangular to ovate-triangular, 1.7—2.1 X 1—1.8 mm, marginally entire, apically rounded to acute or praemorse, glabrous to weakly lepidote; petals spreading post-anthesis, narrowly ovate-triangular, 3.1—4 X 1.2—1.9 mm, apically rounded, glabrous; stamens rudimentary; ovary largely superior, glabrous. **Capsules** with stout pedicels 0.8—1.5 mm long; woody, loculicidally and septicidally dehiscent, ovoid, 8—10 X 3—4.5(—5.5) mm, glabrous, shiny and somewhat ridged-reticulate.

Etymology. This species is named in honor of George B. Hinton (1882–1943), who first collected this species in 1934 and made many important plant collections in then remote regions in the states of México, Guerrero, and Michoacán. Hinton noted on the herbarium label of *Hinton et al.* 8098 that the plant was dead and maguey-like, an observation that is not surprising since individuals of a number of *Hechtia* species give the appearance of being dead because of their leaf coloration, coupled with their pubescence, and they have the general habit of some *Agave* species.

Distribution and habitat. *Hechtia hintoniana* is known only from the states of México and Michoacán, but it is likely to occur in Guerrero. It occurs in deciduous forests, as well as in barrancas, dry roadsides, and thickets between 750 and 900 m elevation.

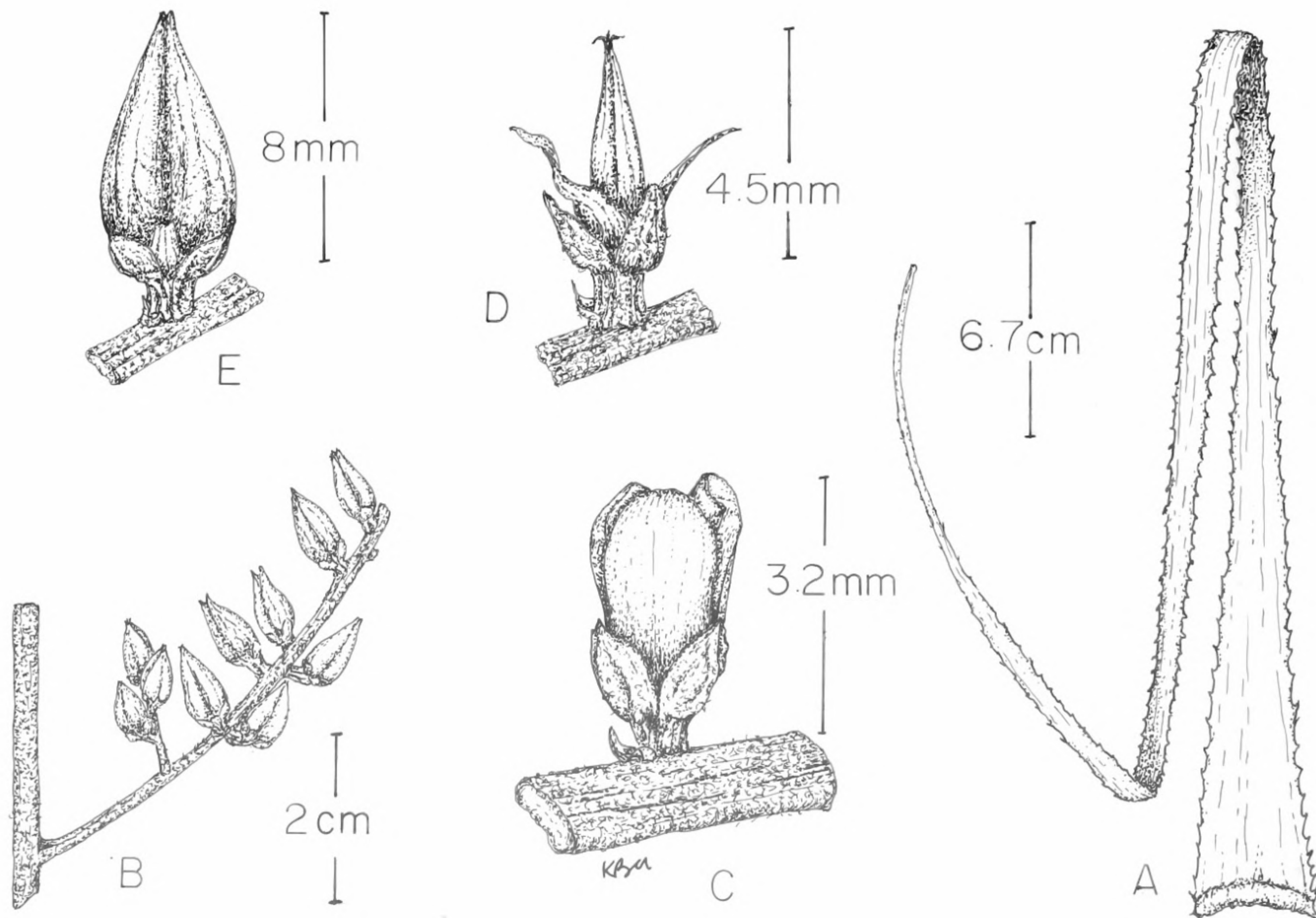


Figure 1. *Hechtia hintoniana*. A. Leaf. B. Part of lateral branch of pistillate inflorescence. C. Staminate flower just prior to anthesis, side view. D. Pistillate flower. E. Capsule. (A, B, D and E from Moore *et al.* 5722, US; C from Matuda 31124, NY).

Hechtia hintoniana immediately stands apart from almost all other *Hechtia* species in its extremely narrow, very long linear-triangular leaf blades, as exemplified by *Hinton* 6506 where the blade is in excess of 93 cm long, but only 1.9 cm wide above the leaf sheath. Unlike both *H. michoacana* and *H. reflexa* L.B. Smith with glabrous lateral branches, floral bracts, and pedicels, those of *H. hintoniana* are consistently conspicuously lepidote. *Hechtia hintoniana* also differs from these species in its subsessile staminate pedicels and shorter pistillate pedicels. In its pubescence *H. hintoniana* is similar to *H. laevis* L.B. Smith but is immediately distinguishable from this latter taxon by its twice-compound inflorescences, branches that generally are flattened for most if not all their

length, subsessile staminate flowers, and very short pedicellate pistillate flowers. *Hechtia hintoniana* shares its reticulate-ridged capsules with *H. reticulata* L.B. Smith but can be separated from this taxon by its twice compound pistillate inflorescences, pubescence, and shorter pistillate pedicels (0.8—1.5 mm vs 2.5—3.5 mm). See Table 1.

Additional specimens examined. MEXICO. México. Dto. Temascaltepec, Naranjo, 27 Aug, 1934, G.B. Hinton 6506 (K, US); Bejucos, 26 Jul 1935, Hinton 8098 (K, US). Michoacán. ca 44.5 km from El Temascal on rd to Huetamo, 900 m, 13 Nov 1949, *H. Moore et al.* 5722 (BH, BM, US [2]).

	<i>H. hintoniana</i>	<i>H. laevis</i>	<i>H. michoacana</i>	<i>H. reflexa</i>
Blade length (cm)	36.5+—93+	29—60	26—61	40—116+
Blade width (cm)	0.6—2.2(—3.5)	2.3—3.7	1.2—2.4(—2.9)	2.8—4
Lowermost scape bract orientation	unknown	reflexed above sheath	ascending	reflexed above sheath
♀ inflorescence	twice compound	once compound	once compound, rarely twice compound	twice compound
♂ pedicel length (mm)	subsessile <0.5	(1—)1.6—4	(0.8—)1.3—2.2	(1—)1.3—1.8)
♂ petal length (mm)	2—3	1.9—2.9	(1.6—)3—3.5	2.1—2.7
♀ pedicel length (mm)	0.8—1.5	1.5—3.5	1.5—3.5(—4.5)	(1.5—)3—4.2
♀ petal length (mm)	3.4—4	2.5—4	(2.3—)3—4.5	4—5

Table 1. Comparison of *H. hintoniana*, *H. laevis*, *H. michoacana*, and *H. reflexa*

2. HECHTIA MICHUACANA Burt-Utley, Utley, and García-Mendoza, sp. nov. TYPE. MEXICO.

Michuacán. 13.9 mi SE of S side of Puente Coahuayana at Colima-Michuacán border, 300—400 ft, 11 Aug 1989, *J. Utley & K. Utley 8456* (holotype: MEXU; isotypes: CAS, GH, IBUG, M, MICH, MO, NY, US, USF). Figure 2.

Planta florens 0.3—0.9 m diam et (5.5—)10.2—14 dm alta; folia 26—61 cm longa; lamina ubique lepidota. Inflorescentia terminalis; rami laterales 6—22.5 cm longi; inflorescentia masculorum tripinnata plerumque cum ramis secundaris 0—2 sed femineorum bipinnate raro tripinnate. Florum femineorum petala triangularia vel ovato-triangularia (2.3—)3—4.5 longa et 1—1.2 mm lata patentia. Capsulae crustaceae (5—)6—9 mm longae, 2.5—4.5 mm diam.

Plants in flower 0.3—0.9 m diam and inflorescences (5.5—)10.2—14 dm high, usually occurring in clusters of individuals. Leaves several, subascending to spreading, recurving distally, 26—61 cm long; sheaths on oldest leaves reniform to transversely elliptic, 2.5—4.5 X (3.5—)4.4—5.7(—8.5) cm, marginally spinose and floccose, both surfaces glabrous and lustrous becoming lepidote distally; blades straight to falcate, very narrowly triangular, 1.2—2.4(—2.9) cm wide just above the sheath, often very densely lepidote above and lepidote below, green to maroon, the margins armed with generally antrorse or occasionally spreading or retrorse red-brown tips 0.7—2.5 cm apart and tips (2—)2.5—4.5(—5) mm long. Inflorescences terminal, in staminate individuals usually twice compound with 1—2 secondary branches, or rarely once compound, glabrous; in pistillate individuals once compound or rarely with 1—2 short secondary branches, glabrous; scape 35—99.5 cm long, 3.5—7 mm diam, glabrous; lowermost scape bracts foliaceous, ascending, greatly exceeding the internodes, 19—26 cm long, lepidote; the remaining scape bracts becoming progressively reduced distally and shorter than to exceeding the internodes, ovate-triangular with linear blades, 1.1—8 cm long; rachis 35—92 cm long; primary bracts chartaceous, 0.9—2.7 cm long, much shorter than the lateral branches and usually shorter than the sterile bases of branches; lateral branches laxly many-flowered, proximally flattened, those of staminate inflorescences ascending to subascending, but those of pistillate inflorescences arcuate and ascending to subascending, 6.5—22.5 cm long. Staminate flowers spreading to subascending, floral bracts adnate to the pedicels and often exceeding the pedicels but shorter than the sepals, membranaceous, convex, ovate 1.2—2.5 X 0.7—1.2 mm, marginally finely serrulate distally, apically apiculate to attenuate-acuminate, glabrous; pedicels slender, (0.8—)1.3—2.2 mm long; sepals membranaceous, ovate, 0.9—1.5 X 0.5—1.1 mm, marginally entire to serrulate distally, apically incised to praemorse or apiculate, deep to light pink or green with maroon maculations; petals elliptic but drying spatulate, (1.6—)3—3.5 X 1—1.7 mm, apically rounded, white, cream-colored or light to dark pink; stamens 6; ovaries rudimentary. Pistillate flowers ascending to subascending; floral bracts adnate to the pedicels, shorter than the sepals, chartaceous to membranaceous, narrowly ovate to ovate, convex, 1.5—2.5 X 0.8—1.8 mm, marginally entire to finely erose, apically variable, apiculate to attenuate-acuminate or praemorse, glabrous; pedicels slender, not articulated with the rachis, slender, 1.5—3.5(—4.5) mm long, glabrous; sepals membranaceous, triangular to ovate-triangular, 1.2—2 X 0.7—1.1 mm, marginally entire to serrulate distally, apically acute-praemorse to apiculate, glabrous, colored like the staminate sepals; petals spreading, narrowly triangular, (2.3—)3—4.5 X 1—1.2 mm, apically rounded, glabrous, colored like the staminate petals; stamens rudimentary; ovary largely superior. Capsules with pedicels (1.5—)2.5—5 mm long, crustaceous, loculicidally and septicidally dehiscent, narrowly ovoid to narrowly ellipsoidal, (5—)6—9 X 2.5—4.5 mm, glabrous, smooth, green suffused with red when immature but becoming yellow-brown and reticulate at maturity.

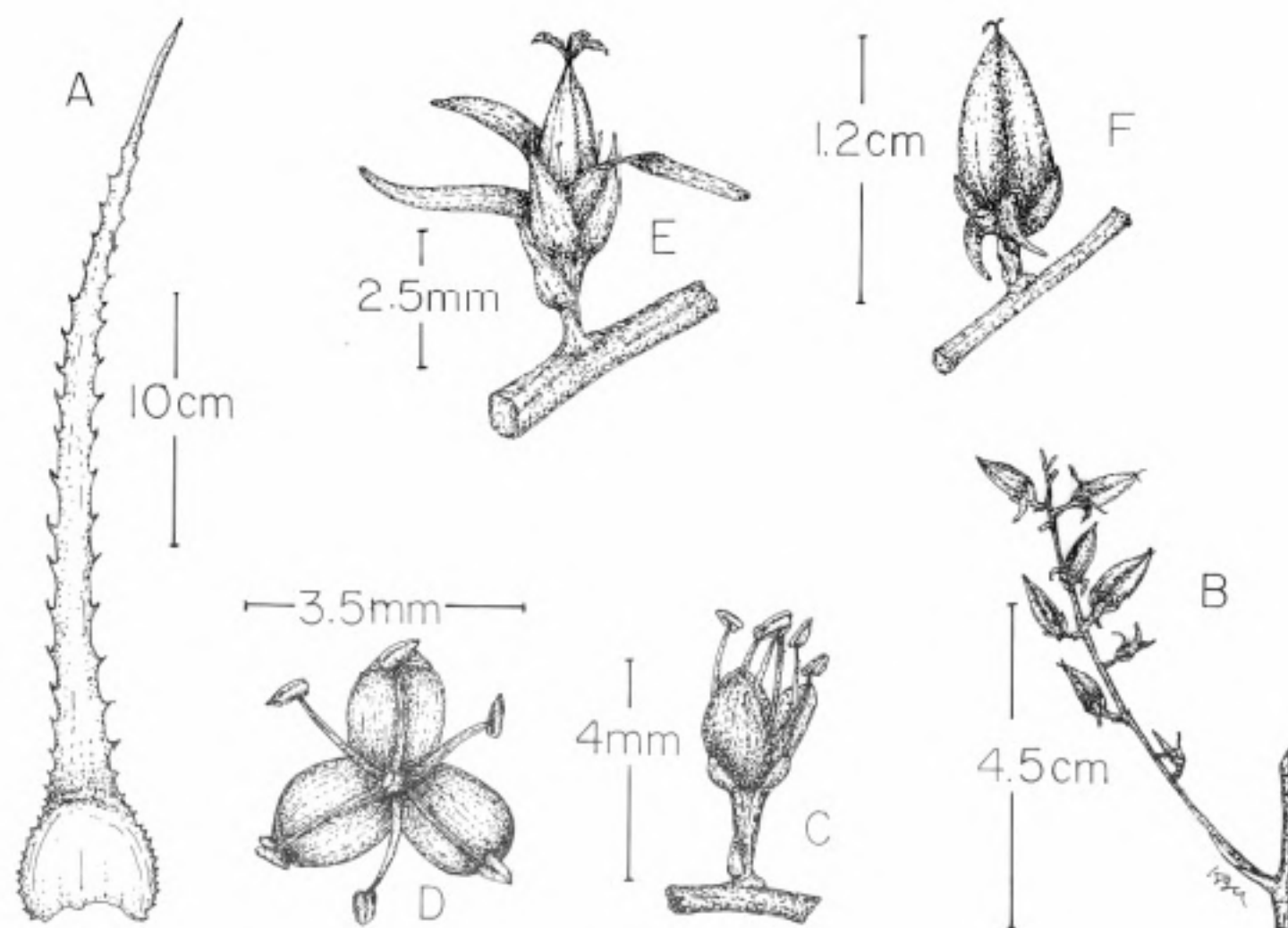


Figure 2. *Hechtia michoacana*. A. Leaf. B. Part of lateral branch of pistillate inflorescence. C. Staminate flower just opening, side view. D. Staminate flower, face view. E. Pistillate flower post-anthesis. F. Capsule. (A, B, D, E and F from Utley & Utley 8456; C and D from Utley & Utley 8386).

Distribution and Habitat. *Hechtia michoacana* is found between 300–1400 ft elevation, growing on karstic rocks or rocky hillsides in full sunlight with thorn-scrub vegetation or adjacent to tropical deciduous forests with *Bursera*, *Plumeria*, and *Cnidoscolus*.

Pedicel length is variable among pistillate specimens of Utley & Utley 8456 and Utley & Utley 8386 but are generally longer than those of staminate flowers. In addition to this dimorphism, inflorescences of staminate inflorescences are typically twice compound, while those of pistillate inflorescences are once compound. Dimorphisms for floral or inflorescence were observed in *H. glauca* Burt-Utley & Utley (Burt-Utley & Utley 1993), as well as in *H. matudae* L.B. Smith and other species, pers. obs.). Unlike the conspicuously lepidote leaves of individuals from the coast of Michoacán, those from near Infernillo (Utley & Utley 8386) appear lustrous and glabrous, but close examination revealed abundant trichomes with diaphanous wings, thus giving the leaves their glabrous appearance. This level of variability is not unusual and has been observed within populations of other *Hechtia* species (pers. obs.). Flower color among individuals of the same sex varied from population

to population, ranging from white to cream or dark pink. This variability can be observed in other *Hechtia* species, including *H. lyman-smithii* Burt-Utley & Utley. In Michoacán and elsewhere in western Mexico, *H. michoacana* is most similar to *H. reflexa* L.B. Smith, which has reflexed lateral branches. This character can be observed on mature pistillate inflorescences of *H. reflexa* and contrasts with the subascending to ascending branches of pistillate and staminate inflorescences of *H. michoacana*. *Hechtia michoacana* also differs from *H. reflexa* in its less numerous secondary branches on staminate inflorescences (0–2 vs 3–7) and larger staminate petals [(1.6–)3–3.5 X 1–1.7 mm vs 2.1–2.5 X 1.2–1.5 mm]. *Hechtia michoacana* is similar to *H. laevis* in its pistillate and staminate flower form but lacks the conspicuously lepidote inflorescences, floral bracts, pedicels, and sepals characteristic of this latter taxon. See Table 1.

Additional specimens examined. MEXICO. Michoacán. 4 km carratera Placita-Tecomán, Mpio. Aquila, 250 m, 9 Dec 1979, *P. Guerrero C. et al.* 555 (USF, XAL); 300 m, 5 Nov 1990, *Guerrero C. et al.* 1315 (USF, XAL); 4.6 mi SE of Hwy 37 on rd to Infernillo, 1000 ft, 21 Dec 1988, (fr) *Utley & Utley* 8267 (MEXU, USF); 9.5 mi SE of Hwy 37 on rd to Infernillo, 1400 ft, 10 Jul 1989, *Utley & Utley* 8386 (B, M, MEXU, MICH, US, USF).

3. HECHTIA OAXACANA Burt-Utley, Utley, and García-Mendoza, sp. nov. TYPE. MEXICO.

Oaxaca. North-central Oaxaca growing on steep hillsides and karstic rock outcrops with secondary vegetation, 5500–5700 ft, 28 Jul 1987, *J. Utley & K. Utley* 7960 (holotype: MEXU; isotypes: CAS, GH, M, NY, US, USF). Figure 3.

Planta florens ad 0.5 m diam et (7.2–)11.6–17.7(–19.5) dm alta; folia multa; lamina ubique lepidota. Inflorescentia terminalis. Florum masculorum pedicelli (0.5–)1.5–2(–3) mm longi; bractae florales lepidotae vel glabrae pedicellum excedentes et sepala interdum excedentia; sepala ovata vel ovato-triangularia 1.2–2.5(–3.5) mm longa et 1.3–2.5 mm lata. Florum femineorum pedicelli 1–2 mm longi; bractae florales sepala interdum excedentia anguste ad late ovatas vel ovato-oblongas 3–6 mm longa et 3–5.5 mm lata; petala 3–4.5(–5.5) mm longa. Capsulae ovoideae 7–9(–11.5) mm longae et (3–) 4–5(–6) mm diam.

Plants in flower with rosettes 0.3–0.5 m diam and inflorescences (7.2–)11.6–17.7(–19.5+) dm high, usually in large colonies to 3–5 m diam. Rosettes occasionally producing stout stolons. Leaves very numerous, subascending but becoming subspreading with age (13–)22–45.5 cm long; sheaths on older leaves reniform to transversely elliptic, 2.3–5.6 X (3.5–)5–8.3 cm, lepidote distally above and beneath, marginally spinose and floccose; blades straight to falcate, narrowly triangular, (1–)1.5–2(–2.5) cm wide above the sheath, lepidote to glabrescent above and lepidote below, the margins armed with generally antrorse or occasionally retrorse red-brown tips (0.4–)1.4–2(–2.5) cm apart and (1.5–)2.5–3.5(–4.5) mm long. Inflorescences terminal, in both staminate and pistillate individuals glabrous to lepidote and once compound, or rarely twice compound with very short basal secondary branches in staminate inflorescences; scape 43–71.5 cm long, (6–)8–14(–18) mm diam, glabrous to finely lepidote; lowermost scape bracts numerous, foliaceous, ascending, (13–)16–22 cm long with narrowly linear-triangular spinose blades; upper scape bracts ascending, generally exceeding the internodes, rarely equal to or shorter than the internodes, lance-ovate with adpressed linear-triangular blades (2.2–)3.4–5.9 cm long; rachis often weakly geniculate, (3.3–)5.5–7.8(–13.9) dm long, irregularly to finely lepidote or glabrous; primary bracts generally shorter than all but the shortest lateral branches, (0.7–)1.5–2.5(–3.8) cm long, marginally finely spinulose, glabrous to lepidote; lateral branches articulated with the rachis, flattened basally, sulcate when dry, ascending to subascending, (1–)2–11(–17.5) cm long, laxly to very densely many-

flowered throughout and then appearing substrobiliform to strobiliform, glabrous to lepidote. **Staminate flowers** spreading to subascending or ascending; floral bracts shorter than to equaling or exceeding the sepals, rugulose proximally, cartilaginous to chartaceous, narrowly to broadly ovate or ovate-triangular to suborbicular, flat to convex, (2.2—)3—7(—9) X (1.7—)2.5—5(—6) mm, externally glabrous to finely lepidote, marginally finely spinulose to erose, apically variable, spinulose to apiculate, acute, rounded or praemorse; pedicels articulated with the rachis, stout, (0.5—)1.5—2(—3) mm long, glabrous to lepidote; sepals somewhat imbricate, subequal, ovate to ovate-triangular, convex, 1.2—2.5(—3.5) X 1.3—2.5 mm, marginally entire to erose, apically rounded to acute or praemorse, glabrous; petals spreading at anthesis, oblong-elliptic to ovate-elliptic becoming spatulate when dry, cucullate distally, 2.5—4.8 X 1.5—3 mm, marginally entire, apically rounded, glabrous, greenish white; stamens 6, filaments basally briefly adnate to the petals; ovary rudimentary. **Pistillate flowers** spreading to ascending; floral bracts shorter than to exceeding the sepals, rugulose proximally, chartaceous to cartilaginous especially proximally, occasionally membranaceous distally, narrowly ovate to broadly ovate or oblong-ovate, convex, 3—6 X 3—5.5 mm, marginally hyaline and entire to finely spinulose or erose, apically apiculate to spinulose, glabrous to lepidote; pedicels articulated with the rachis, stout, triqueterous, 1—2 mm long, glabrous to lepidote; sepals subimbricate, triangular to ovate-triangular, 2—3(—4) X 1.2—2.5(—3.5) mm, marginally entire, apically rounded to acute, apiculate or praemorse, glabrous or rarely weakly lepidote; petals suberect, narrowly ovate to triangular, 3—4.5(—5.5) X 1.5—2.8 mm, apically rounded to spinulose tipped; stamens rudimentary; ovary largely superior, glabrous. **Capsules** with stout pedicels 1.5—2(—3.5) mm long; woody, loculicidally and septicidally dehiscent, ovoid, 7—9(—11.5) X (3—)4—5(—6) mm, glabrous, smooth or somewhat reticulate.

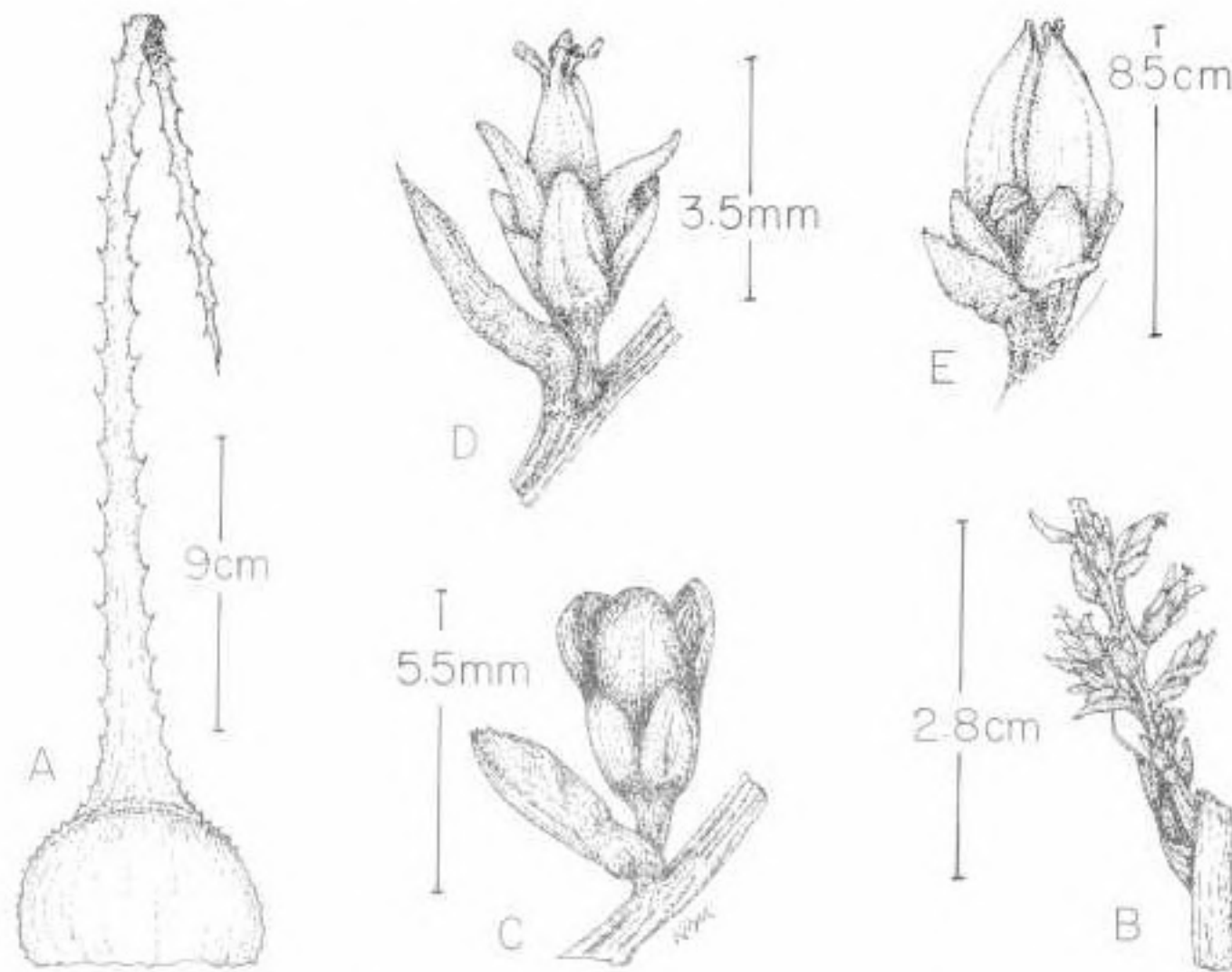


Figure 3. *Hechtia oaxacana*. A. Leaf. B. Lateral branch of pistillate inflorescence. C. Staminate flower just prior to anthesis. D. Pistillate flower at anthesis. E. Capsule. (A, B, C, D from Utley & Utley 1960, E from Utley & Utley 1957).

Distribution and habitat. Known only from northern Oaxaca between 5400 and 7800 ft, where it grows on steep karstic slopes with secondary vegetation and remnant *Quercus*, *Pinus*, *Juniperus*, and occasionally *Ephedra*.

Phenology. Flowering specimens have been collected in April, May, July, and August. On the herbarium label of *Webster et al. 13018* is the notation that flowers of *Hechtia oaxacana* are visited by bees and wasps. This is consistent with our observations of a number of *Hechtia* species. In addition to bees and wasps, a variety of insects including butterflies, flies, and beetles are common visitors to open staminate and pistillate flowers, which provide rewards of nectar and pollen or only nectar (pers. obs.).

Individuals of *Hechtia oaxacana* vary greatly in size within the populations surveyed which may result from one or more factors: local differences in substrate conditions, age of the flowering individuals, and genetic variability. Specimens exhibited several-fold differences in leaf size and corresponding ranges in inflorescence length. Similar striking size differences among individuals have been observed in other *Hechtia* species including *H. pumila* Burt-Utley & Utley from Guerrero and in populations of *H. bracteata* and *H. sphaeroblasta* that are discussed later in this paper. It should be noted that individuals in some populations of *H. oaxacana* (Utley & Utley 8484 & 8943) produce stolons from axillary buds which then give rise to new rosettes some distance from the parent plant. This character is not unique to *H. oaxacana* and has been observed in other species within *Hechtia*, including *H. pueblensis* described herein, *H. glomerata* Zuccharini, *H. schottii* Baker ex Hemsley, and *H. sphaeroblasta* B.L. Robinson (pers. obs.). In these species, stolon formation varies among populations and cannot be considered diagnostic of these taxa. Inflorescences of *H. oaxacana* are usually densely to very densely flowered and appearing strobiliform, but in some individuals within a population, flowers on the lateral branches occur in verticils or the inflorescences are less commonly laxly flowered. Pubescence is also highly variable among individuals within a population, including the type series, Utley & Utley 7960. Within a population, lateral branches, floral bracts, and pedicels range from almost glabrous to lepidote, depending upon the individual examined. Inflorescence and floral characters of *H. oaxacana* most closely resemble those of *H. bracteata* in their conspicuous floral bracts, but *H. oaxacana* can be distinguished readily from this latter species by its shorter primary bracts [(0.7–)1.5–2.5(–3.8) cm vs (1.2–)2.5–8(–11) cm long], generally smaller staminate sepals [1.2–2.5(–3.5) mm vs (2–)3–4.5(–5) mm long] and shorter pistillate floral bracts [3–6 vs (6–) mm vs 7–9(–12) mm].

Additional specimens examined. MEXICO. Oaxaca. N-central Oaxaca on steep slopes and calcareous hillsides, 7800 ft, 26 Jul 1987, Utley & Utley 7951 (MEXU, USF, XAL); Utley & Utley 7952 (USF); 4 mi N of Teposcolula at Zocalo on MEX 125, 7700 ft, 26 Jul 1987, Utley & Utley 7957 (GH, K, M, MEXU, US, USF, XAL); MEX 125 to Tlaxiaco ca 6.6 km S of jct of MEX 190 with MEX 125, 7100 ft, 20 May 1990, Utley & Utley 8485 (CAS, IBUG, MEXU, NY, US, USF); Utley & Utley 8943 (MEXU, MICH, NY, US, USF); Utley & Utley 8969 (GH, MEXU, NY, US, USF); limestone slopes in woodland with *Juniperus* and *Quercus*, 5400–5500 ft, 16 Aug 1962, G. Webster et al. 13018 (GH, MEXU, US).

4. HECHTIA PUEBLENSIS Burt-Utley, Utley, & García-Mendoza, sp. nov. TYPE. MEXICO.

Puebla. between 1.1 and 4.9 mi S of Zapotitlán on MEX 125 from Tehuacán to Huajuapán de León. Rocky soil on exposed, dry slopes with thorn-scrub vegetation, 5500–5700 ft, 25 Jul 1987, J. Utley & K. Utley 7948 (holotype: ♀ and ♂ MEXU; isotypes: B, BM, CAS, CU, GH, M, MICH, MO, NY, TEX, US, USF, XAL). Figure 4 and Figure 5.

Planta florens 0.3—0.45 m diam et 15.3—21.1 dm alta; folia multa; lamina supra glabram. Inflorescentia terminalis. Florum masculorum pedicelli 1.5—2.5 mm longi; bractae florales pedicellum et sepala excedentes glabrae; sepala late ovata vel ovato-triangularia 2.3—3 mm longa et 2—2.5 mm lata. Florum femineorum pedicelli 1.5—3 mm longa glabri; bractae florales pedicellum excedentes ovata ad late ovata, 2.5—4.5(—6) mm longa et 2—3(—5) mm lata, petala ovata-triangularia ad triangularia, 3—4 mm longa et 1.5—2.4 mm lata. Capsulae ovoideae 7—8.5 mm longa et 4—5.5 mm diam.

Plants in flower with rosettes 0.3—0.45 m diam and inflorescences to 15.3—21.1 dm high, usually in large colonies to 5—10+ m diam. Rosettes producing stout stolons. Leaves very numerous, spreading to subascending, 33—39 cm long; sheaths on older leaves 3.2—5.2 X (5.1—)6.3—9.2 cm, glabrous above but lepidote distally beneath, marginally aggressively spinose; blades straight to weakly falcate, triangular, 2.8—3.5 cm wide above the sheath, the margins armed with antrorse, retrorse and spreading red-brown tips 1.3—2.5 cm apart and the tips 3—4 mm long, glabrous and lustrous above but sparingly lepidote above the blade-sheath junction, lepidote below. Inflorescences terminal, in staminate individuals often twice compound, but in pistillate individuals once or twice compound, when twice compound both usually with 2 basal branches arising from or near the axis of the inflorescence and bordering the primary branch and occasionally 1 or more additional secondary branches; scape stout, to 99+ cm long, (0.8—)1.5—3.1 cm diam, glabrous; lowermost scape bracts numerous, foliaceous, ascending, 23—33 cm long with linear-triangular aggressively spinose blades; upper scape bracts generally longer than the internodes, lance-ovate with adpressed linear-triangular blades (2.4—)3—16.5 cm long; rachis (4.8—)7.5—10.6 dm long, glabrous; primary bracts shorter than all but the shortest lateral branches, (1.9—)2.5—10.3 cm long, marginally finely spinulose, glabrous above but finely lepidote below; lateral branches sulcate, fertile throughout, those of staminate inflorescences spreading to subascending, sometimes falcate, 5.6—12 cm long, densely to very densely many-flowered throughout, glabrous, those of pistillate inflorescences subascending to ascending, straight or weakly falcate, (3.5—)7.5—23(—38) cm long, densely flowered, the flowers sometimes verticillate. **Staminate flowers** spreading to subascending; floral bracts generally exceeding the sepals, cartilaginous to chartaceous, ovate to broadly ovate or ovate-triangular, convex and keeled, 3.5—8 X 3—5 mm, externally glabrous, marginally entire to erose distally, apically acuminate to attenuate-acuminate; pedicels articulated with the rachis, stout, 1.5—2.5 mm long, glabrous; sepals convex and at least one cucullate distally, broadly ovate, 2.3—3 X 2—2.5 mm, marginally erose to finely spinulose, apically rounded to praemorse, lustrous and glabrous; petals spreading at anthesis, oblong-elliptic to ovate-elliptic becoming spatulate when dry, 3.5—5 X 2—2.6 mm, marginally entire, apically rounded, glabrous, pale cream; stamens 6, with filaments basally briefly adnate to the petals; ovary rudimentary. **Pistillate flowers** subsecund and generally ascending; floral bracts shorter than to equaling or exceeding the sepals and much of the petals, chartaceous to coriaceous especially proximally, marginally hyaline, ovate to broadly ovate, convex, 2.5—4.5(—6) X 2—3(—5) mm, marginally entire to very finely erose to denticulate, especially distally, apically acuminate to apiculate, glabrous; pedicels articulated with the rachis, stout, 1.5—3 mm long, glabrous; sepals coriaceous especially post-anthesis, marginally broadly hyaline, weakly overlapping, convex, triangular to ovate-triangular, 1.8—2.4(—3.3) X 1.5—2.5(—3.2) mm, marginally finely erose to entire, apically rounded to praemorse or apiculate, glabrous; petals subspreading, ovate-triangular to triangular, 3—4 X 1.5—2.4 mm, apically rounded to praemorse or apiculate; stamens rudimentary; ovary largely superior, glabrous. **Capsules** with stout pedicels 1.5—3.5 mm long; cartilaginous, loculicidally and septicidally dehiscent, ovoid, 7—8.5 X 4—5.5 mm, glabrous, somewhat rugulose, yellow-brown.

Distribution and habitat. Known only from the vicinity of the type locality in Puebla, where it forms large populations on extremely dry, exposed slopes and hillsides with low thorn-scrub vegetation and tall, columnar cacti as well as other cacti.



Figure 4. *Hechtia pueblensis*. Isotype of part of a staminate inflorescence (from Utley & Utley 7948, USF).



Figure 5. *Hechtia pueblensis*. Isotype of a leaf and branch of pistillate inflorescence (from Utley & Utley 7948, USF).

A brief characterization of the pistillate material of *Hechtia pueblensis* was included in the ample description of *H. tehuacana* (Robinson 1904). On all specimens from the type series of this taxon examined (*Pringle* 8578, CU, F, GH, LL, MEXU, US), there is a small branch of pistillate or capsular material or both, as well as a leaf and a part of a staminate inflorescence. Apparently when Pringle collected this material, he removed lateral branches from a pistillate inflorescence well post-anthesis, as well as lateral branches from an individual with better developed capsules, and then branches from a staminate individual. Leaves are all from the same specimen, as judged by their size, spines, and pubescence and are presumably from a staminate plant because of the differences in leaf pubescence mentioned previously. Since the major portion of Robinson's description focused on vegetative and staminate material, the pistillate material well post-anthesis is recognized as a distinct species herein, *H. pueblensis*, while the staminate material is within the variation observed for some populations of *H. podantha*, with which it was synonymized (Smith 1937). Herein, *H. tehuacana* is lectotypified by the staminate material and leaf present on *Pringle* 8578 at GH. In the type series of *H. tehuacana*, staminate pedicels are a bit shorter than those observed in populations of *H. podantha* that we collected from Hidalgo, Morelos, and Puebla. Moreover, our collections reveal potentially minor differences in lateral branch form and robustness, pedicel length, and floral bract length and shape among the numerous populations of *H. podantha* we sampled. Some of this variation could readily be related to the extreme environments where the species occurs. *Hechtia podantha* sensu lato is in need of further study to assess the significance of observed differences and this research is currently in progress. Although *H. tehuacana* was included in the *podantha* species complex (Martínez-Correa et al. 2010) based on the mixed type, the authors failed to realize that the pistillate material represents a distinct species (*H. pueblensis*) and compared their new species, *H. chihinautzensis* Martínez-Correa, Espejo, & López-Ferrari and *H. colossa* Martínez-Correa, Espejo, & López-Ferrari to *H. tehuacana* as circumscribed by Robinson (1904). Moreover, when they compared floral characters among the included taxa, they failed to distinguish between staminate and pistillate inflorescences and their flowers in their table. Because of dimorphisms known to exist between the sexes in species we have collected in flower, it is absolutely essential to compare like parts (Burt-Utley & Utley 1993).

Additional specimens examined. MEXICO. Puebla. Ca San Gabriel Chilac near San Juan Atzingo and San Andrés, ca 1500 m, 24 Jul 1961, *Smith et al.* 4026 (F [2], US [2]); Tehuacán, 2 Aug 1901, ♀, pro parte menor, *C. Pringle* 8578 (B, BM, GH, K, TEX, M, MEXU); MEX 125 between Huajuapán de León and Tehuacán ca 3.6 mi S of Zapotitlán Salinas, 5400 ft, 16 Jul 1991, *Utley & Utley* 8649 (MEXU, USF); 0.8 mi E of MEX 125 on gravel rd to San Luis Atlotitlán, 5300 ft, 17 Jul 1991, *Utley & Utley* 8651 (CAS, CU, M, MEXU, NY, US, USF, XAL).

Taxonomic notes.

HECHTIA BRACTEATA Mez, in Alph. de Candolle, Monogr. Phan. 9: 550. 1896. TYPE. MEXICO. Veracruz. Orizaba, 1833, *F. Müller* 813 (holotype: W; isotype: fragments-B!). *Hechtia confusa* L.B. Smith, Contr. Gray Herb. 117: 22. 1937. TYPE. Mexico. Puebla. Dry calcareous hills, La Cañada, 1897. *C.G. Pringle* 7497 (holotype: GH!).

Hechtia bracteata ranges from Veracruz to adjacent Puebla between 6000 and 8000 ft elevation, where it grows on rocky, dry, exposed hillsides with low thorn-scrub vegetation. In these locations, it is an abundant and often dominant component of the vegetation. Vegetatively, unlike many *Hechtia* species that consist of solitary individuals, *H. bracteata* occurs in clumps of two or more individuals. Lateral branches of both pistillate and staminate inflorescences are very densely flowered on all the specimens we saw or collected.

As interpreted here, *Hechtia bracteata* includes *H. confusa*, which (Smith 1937) described as new because its flowers and pedicels resembled those of *H. podantha* but differed in its ample floral bracts. Plant habit, inflorescence form, floral characters, and capsules of *H. confusa* are indistinguishable from those of *H. bracteata*. The most obvious differences between the holotype of *H. confusa* (Pringle 7479) and specimens collected from the vicinity of its type locality (Utley & Utley 7934) are shorter leaf blades and far less robust inflorescences than those observed on individuals in populations of *H. bracteata* from elsewhere in Puebla or in Veracruz. Interestingly, the more diminutive colonies occur at slightly higher elevations (1100–1400 ft) and more harsh environments than those of the more robust *H. bracteata* populations. Edaphic factors and differences in moisture availability may influence mature plant size in some populations of *H. bracteata* and this is consistent with our observations of populations of other *Hechtia* species observed from elsewhere in Mexico.

Most recently *Hechtia bracteata* and its synonym *H. confusa* were both included as distinct species in the *H. podantha* complex (Martínez-Correa et al. 2010). Their inclusion in this complex ignores the obviously articulated pedicels and ample floral bracts characteristic of this species that are not evident on the other taxa included in the group and strongly suggests that the circumscription of the complex needs re-evaluation.

Representative specimens examined. MEXICO. Puebla. Cerros calizos con matorral espinosa, Salinas T. F4211 (MEXU); ca 6.3 mi NE of jct of MEX 150 with rd into Tehuacán, 6000 ft, 5 Jul 1982, Utley & Utley 6931 (MEXU); 4.9 mi N of MEX 150 libre on MEX 28 to Esperanza and 2.9 mi S of Cañada Morelos, 7700 ft, 18 Jun 1987 Utley & Utley 7911 (MEXU, USF); Utley & Utley 7934 (C, CAS, GH, MO, NY, XAL); 7700–8000 ft, 21 Jul 1987, Utley & Utley 7935 (B, GH, M, MEXU, US, USF); 10 Feb 1994, Utley & Utley 8878 (MEXU); 30.8 mi N of Acatlán on rd from Acatlán to Ixcaquixtla, 6300 ft, 15 Jul 1991, Utley & Utley 8642 (MEXU). Veracruz. 0.2 mi W of Acultzingo on MEX 150 libre to Puebla, 6000–6100 ft, 21 Jul 1987 Utley & Utley 7912 (GH, M, MEXU, US, USF, XAL); ca 2.2 mi W of Acultzingo on MEX 150 libre to Puebla state line, 6400 ft, 4 Aug 1991, Utley & Utley 8748 (CAS, GH, MEXU, US, USF, XAL); 6270 ft, 31 May 1992, Utley & Utley 8785 (B, CAS, GH, MEXU, MICH, NY, US, USF, XAL); 6600 ft, 10 Feb 1994, Utley & Utley 8879 (MEXU).

HECHTIA SPHAEROBLASTA B.L. Robinson, Proc. Amer. Acad. Arts 35: 323. 1900. **TYPE.** MEXICO. Guerrero. Tlapa, 1200 m, 3 Dec 1894, Nelson 2044 (holotype: GH!; isotype: US!).

Hechtia sphaeroblasta was thought to be known only from its type from Tlapa, Guerrero, which consists of fragments of a staminate inflorescence and a leaf and was distinguished from *H. stenopetala* Klotzsch by its stamens that were considered to be included rather than exerted (Smith & Downs 1974). Although this species was occasionally collected, pistillate specimens including Moore 5278 and Moore & Wood 4737 all were identified as *H. stenopetala* Kl. or *H. podantha* (Smith & Ruiz Mora 3215a). In addition to *H. sphaeroblasta*, *H. stenopetala* included elements of several other species, including *H. melanocarpa* L.B. Smith (Burt-Utley & Utley 1988), *H. cordylinioides* Baker, and *H. hintoniana*, which is described herein. Matuda's collection of *H. sphaeroblasta* (Matuda et al. 38471) and ours from near Tlapa de Comonfort, Guerrero (Utley & Utley 8566), and elsewhere in Guerrero, Puebla, and Oaxaca establish that this species is abundant in a number of different habitats in these Mexican states. Individuals vary significantly in size at flowering among and within populations and in the presence or absence of stolons. *Hechtia sphaeroblasta* grows epilithically on rock faces adjacent to deciduous forests but also terrestrially on calcareous soils in or near deciduous forests and on steep, exposed karstic slopes. Individuals may be solitary or occur in colonies. *Hechtia*

sphaeroblasta is readily distinguished from other taxa by its glabrous, characteristically twice compound pistillate and staminate inflorescences with ascending branches.

Representative specimens examined. MEXICO. Guerrero. Cañon del Zopilote, km 267—268 between Venta Vieja and Milpillas on hwy between Mexcala and Chilpancingo, ca 2000 ft, 23 Aug 1948, *Moore & Wood* 4737 (US); Cañon del Zopilote between Mexcala and Zumpango, 1950—2700 ft, 23 Aug 1948, *Moore* 5278 (BH, C, US); Xochihuehuetlán, adelante de Tlapa, 1300 m, 15 Aug 1972, *Matuda et al.* 38471 (MEXU, US); 1.4 mi W of Tlapa de Comonfort on hwy from Tlapa to Chilpancingo, 3800 ft, 29 Jul 1990, *Utley & Utley* 8566 (GH, MEXU, NY, US, USF). Oaxaca. alrededores de la Planta Hidroeléctrica 7 km al NW de Tamazulapan, 1750 m, 18 Apr 1965, *Rzedowski* 19699 (US); 10.7 mi S of Oaxaca-Puebla state line on MEX 125 from Huajuapán to Tehuacán, 6100 ft, 11 Aug 1986, *Utley & Utley* 7623 (CAS, MEXU, USF); between 16.2—17.6 mi N of MEX 190 at Huajuapán de León on MEX 125 from Huajuapán to Tehuacán, 6400—6500 ft, 25 Jul 1987, *Utley & Utley* 7946 (GH, MEXU, MICH, US, USF); 6700 ft, 25 Jul 1987, *Utley & Utley* 7947 (MEXU, NY, USF, XAL); 15.5 mi SE of Huajuapán de León on MEX 190 to Oaxaca, 7100 ft, 30 Jul 1990, *Utley & Utley* 8572 (MEXU). Puebla. On hwy from Puebla-Oaxaca, 16 Dec (year not given), *Smith & Ruiz Mora* 3215 a (F); 40 .6 mi S of square at Acatlán on rd to Izúcar de Matamoros, 4000 ft, 9 Aug 1986, *Utley & Utley* 7619 (B, BM, CAS, F, GH, K, MEXU, MO, NY, US, USF); 12.7 mi S of on MEX 190 to Acatlán and Huajuapán de León, 4400 ft, 24 Jul 1987, *Utley & Utley* 7942 (MEXU, USF); MEX 190, 10.3—11 mi NW of Acatlán, 4700—4800 ft, 29 Jul 1990 *Utley & Utley* 8569 (C, GH, M, MEXU, MO, NY, USF, XAL); ca 0.6 mi S of Chinantla on rd to Tlapa de Comonfort, 4000 ft, 15 Jul 1991, *Utley & Utley* 8643 (GH, MEXU, US, USF).

HECHTIA TEXENSIS S. Watson, Proc. Amer. Acad. Arts. 20: 374. 1895. TYPE. USA. Texas. On limestone cliffs in the great bend of the Rio Grande, Aug 1883, *Havard* 85 (holotype: GH!; isotype: GH!).

Hechtia elliptica L.B. Smith, Contr. Gray Herb. 117: 20. 1937. TYPE. MEXICO. Coahuila. Saltillo, 1898, *Palmer* 205 (holotype: GH!; isotypes: BM!, C!, UC, US!).

Hechtia zacatecae L.B. Smith, Contr. Gray Herb. 117: 21. 1937. TYPE. MEXICO. Zacatecas. High ridges, Cedros, 1908, *Kirkwood* 5 (holotype: GH!; isotypes: F!, MO).

Hechtia texensis is distributed from Texas in the USA to the northern Mexican states of Chihuahua, Coahuila, and Zacatecas. *Hechtia texensis* was distinguished from both *H. elliptica* and *H. zacatecae* using sepal length vs width (shape) as a key character (Smith 1937; Smith & Downs 1974); however, pistillate sepals of *H. texensis* were being compared to staminate sepals of both *H. elliptica* and *H. zacatecae* (Burt-Utley & Utley 1987). When staminate sepals as well as pistillate sepals and capsules of these taxa are compared with one another, it is impossible to distinguish either *H. elliptica* or *H. zacatecae* from *H. texensis*. Smith (1937) and Smith and Downs (1974) further distinguished *H. elliptica* from *H. zacatecae* by sepal characters that were characterized as elliptic and obtuse in *H. elliptica* but ovate and acute in *H. zacatecae*. Both shapes and apices are observed on the type specimens of both taxa. As noted previously, sepal shape within an individual flower in *H. texensis* is variable (Burt-Utley & Utley 1987) and an unreliable character. The sepals of *H. elliptica* were described as deep rose and those of *H. zacatecae* as being stramineous. Sepals on the holotypes of both taxa have minute maroon maculations, but those of *H. elliptica* are denser, giving them a “rose” rather than stramineous appearance. Furthermore, leaves of *H. elliptica* were characterized as being splashed bright rose, while those of *H. zacatecae* were green (Smith 1937; Smith & Downs 1974). When specimens from the type series of *H. elliptica* were examined, it was obvious that the leaf coloration resulted from a pigmented compound that was deposited on their leaf surfaces and also

absorbed into their hypodermises. Our collections from the vicinity of the type locality of *H. elliptica* and near the type locality of *H. zacatacae* all support the synonymy of *H. elliptica* and *H. zacatacae* with *H. texensis*.

Representative specimens examined. MEXICO. Chihuahua. 20 km ENE of Cd. Jiménez, 5100 ft, 2 Oct 1973, *Henrickson 13775* (LL, TEX). Coahuila. 8.8 mi NE of Glorietta on N side of Saltillo on MEX 40 between Saltillo and Monterrey, 1410 m, 22 May 1991, *Utley & Utley 8600* (BM, C, F, GH, K, M, MEXU, NY, TEX, UC, US, USF); 18.3 mi NE of Glorietta on N side of Saltillo on MEX 40 between Saltillo and Monterrey, 1240 m, 22 May 1991, *Utley & Utley 8601* (BM, C, M, GH, MEXU, MO, TEX, US, USF); 7.5 mi N of Glorietta on NW side of Saltillo where MEX 57 and MEX 40 junction on MEX 57 to Monclava, 1460 m, 22 May 1991, *Utley & Utley 8602* (MEXU, TEX, USF); 18.6 mi N of Glorietta on NW side of Saltillo where MEX 57 and MEX 40 junction on MEX 57 to Monclava, 1250 m, 22 May 1991, *Utley & Utley 8603* (BM, C, GH, MEXU, US, USF); 22.9 mi W of Saltillo at Glorietta on W side of Saltillo where MEX 57 and MEX 40 meet, on MEX 57 toward Torreón, 1340 m, 22 May 1991, *Utley & Utley 8604* (MEXU, US, USF); just N of Coahuila-Zacatecas state line on MEX 54, 16.3 mi N of turnoff to Concepción de Oro, 23 May 1991, *Utley & Utley 8606* (MEXU, USF).

HECHTIA GLOMERATA Zuccharini. Abh. Math. Phys. Cl. Königl Bayer. Akad. Wiss. 3: 240, pl. 6. 1840.

Hechtia mexicana L.B. Smith. Contr. Gray Herb. 117: 19. 1937. TYPE. MEXICO. San Luis Potosí. Dept. Valles, Sierra de Abra, 200—300 m, *Maurry 6593* (holotype: F!; isotype GH).

Hechtia glomerata is the most widely distributed species in the genus, ranging from southeastern Texas to Guatemala and has been abundantly collected in Texas and in the northern Mexican states of Tamaulipas, Hidalgo, and San Luis Potosí. In *H. glomerata*, like *H. texensis*, inflorescences are lateral and a robust flowering individual may have two or more inflorescences simultaneously with flowers at anthesis (e.g. *Utley & Utley 9005*). Inflorescences in populations of *H. glomerata* also vary from once compound with short densely flowered to elongate laxly flowered lateral branches to twice compound with elongate lateral branches. Aside from field observations, it is possible to unequivocally determine that the inflorescences are lateral when scape bases are available. In both taxa, the lowermost scape bracts are very short, unlike those of species with terminal inflorescences that typically have foliose lowermost scape bracts.

Hechtia glomerata was distinguished from *H. mexicana* using flower size as a key character (Smith 1937; Smith & Downs 1974). However, the measurements taken from the type of *H. mexicana*, which consisted of an inflorescence branch with mature capsules, included the length of the capsules, in contrast to those of *H. glomerata*, which were based on actual flower size. The size of floral bracts, sepals and the remains of petals from *H. mexicana* are consistent with those obtained from *H. glomerata*; moreover, there are no significant differences in the shapes of these parts when individuals of the same sex are compared from the type locality of *H. mexicana* and populations of *H. glomerata* from throughout its range. Differences in diameters of individuals at flowering, heights of inflorescences, as well as lengths of lateral branches can be observed readily within populations of *H. glomerata* but are likely the result of local edaphic factors, age of flowering individuals, and genetic variability. Our collections (*Utley & Utley 7838*) from the vicinity of the type locality, Sierra del Abra in the state of San Luis Potosí, support these findings as do inflorescence and floral characters from our collections of *H. glomerata* from the states of Tamaulipas, San Luis Potosí, and elsewhere in Mexico.

Representative specimens examined. MEXICO. Tamaulipas. Cerro Tres Vetos, 16 Jul 1930, *Bartlett 10383* (US); 16 m S of Cd Victoria at junction of Cd Victoria-Matamoros hwy with Periférico on rd to Cd Mante, 1200 ft, 23 May 1987, *Utley & Utley 7835* (F, MEXU, USF); Sierra Cucharas, 1100 ft, 23 May 1987, *Utley & Utley 7836* (MEXU, MO, TEX, USF); 10.8 mi S of Cd Mante on hwy to Cd Valles, 900 ft, 23 May 1987, *Utley & Utley 7837* (MEXU, USF); ca 1 mi S of El Abra on MEX 85 from Cd Mante to Cd Valles, 800 ft, 20 Apr 1995, *Utley & Utley 9005* (GH, M, MEXU, TEX, US, USF); ca 1.7 mi S of rd from MEX 85 to Gómez Farías on gravel/dirt rd to Balneario La Florida, 400 ft, 23 May 1994, *Utley & Utley 8928* (GH, MEXU, M, TEX, USF). Hidalgo. Jacala, Puerto de la Zorra near km 284 on hwy N of Jacala, 1500 m, 27 Oct 1946, *Moore 1692* (GH); 10 km al NW de Zimapán, 30 Apr 1965, *González Quintero, 2356* (WIS); slopes of barranca de Tolimán somewhat above mines on rd from Zimapán to Mina Loma del Toro and Balcones, 5000 ft, 8 Aug 1948, *Moore & Wood 4400* (MICH, US). San Luis Potosí. Estacion Microondas Pastoriza, ca 22 km S of Matahuala, 1550–1650 m, 19 May 1973, *Johnston et al* (LL, TEX); El Abra, ca 15 km E of Cd Valles, 15 Apr 1956, 150 m, *Rzedowski 7474* (MEXU, US); 7.3 mi E of Cd. Valles and 2 mi E of El Abra on MEX 70 from Cd Valles to Tampico, ca 600 ft, 24 May 1987, *Utley & Utley 7838* (K, M, MEXU, US, USF). Queretaro. Ca 12.5 mi E of Vizarrón on MEX 120 to Jalpan, 4800 ft, 22 May 1994, *Utley & Utley 8926* (M, MEXU, USF); ca 12.8 mi N of Jalpan on rd from Jalpan to Río Verde, 2200 ft, 22 May 1994, *Utley & Utley 8927* (MEXU). Chiapas. Mpio. La Trinitaria, 3 mi S of La Trinitaria, 5100 ft, 10 Jul 1966, *Breedlove 14478* (MICH, US); 5.3 mi S of La Trinitaria on Mex 190, 4200 ft, 22 Jun 1982, 2800 ft, *Utley & Utley 6854* (MEXU, USF); ca 0.8 mi N of Mex 190 on gravel rd to Cascadas El Aguacero, 26 Jun 1982, *Utley & Utley 6876* (MEXU, USF); 3 km N of Ocozocoautla on rd to Mal Paso, 900 m, 1 Feb 1972, *Breedlove 23916* (MICH, MO, NY); 13 km N of Berriozabal near Pozo Turpache and Finca Suspiro, 900 m, 25 Dec 1972, *Breedlove & Thorne 30856* (MICH). GUATEMALA. Dpto. Quiché. Near Sacapulas, 1040–1240 m, 12–14 Jan 1939, *Standley 62525* (F).

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